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STRATEGIC MANAGEMENT OF PLANT AND SOIL HEALTH UNDER THE INFLUENCE OF TWO AGRIUSABLE NANOCOMPOUNDS IN MAIZE BY TWO *BACILLUS* SPECIES

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The unique physical properties of nanoparticles facilitate their wider application in various fields including agriculture. In general, application of Nano compounds in agricultural practices is reported to decrease nutrient loss and pathogen infestation. Precise use of Nano compounds improves crop production. Zeolites have wider applications in agriculture and environmental engineering. Nanochitosan is used for seed treatment but it can also act as a biopesticide and helps the plants to fight against fungal infections. Zeolite incorporation in soil is found to increase crop yields by promoting nutrient use efficiency. In the present study effect of nanochitosan and nanozeolite was evaluated on plant health, productivity, soil enzymes and microbial population in maize rhizosphere under natural field conditions in the presence of two plant growth promotory *Bacillus* species. Under combined treatment of nanocompounds and PGPRs, significant increase in plant height (8.11%), root length (114%), leaf area (15%), biochemical parameters like chlorophyll (118%), carotenoid content (74.80), protein content (80%) and antioxidant enzyme activity (41%) was reported in treated maize plants as compared to control. Performance of nanozeolite along with two *Bacillus* sp. was better than the nanochitosan treatments in respect to biochemical parameters but activities of catalase, peroxidase and superoxide dismutase (antioxidant enzymes) of maize leaves were high in the treatment containing nanochitosan and *Bacillus* sp.. Study of microbial population of the treated soil using qRT-PCR showed abundance of 16S rDNA in the form of copy number as compared to control. Two fold increase in the activities of two major indicator enzymes (Fluoroscine diacetate hydrolase and arylesterase) of soil health was observed in the treated soil as compared to control. Enzyme activities were maximum in the presence of nanozeolite and *Bacillus* sp. as compared to nanochitosan and *Bacillus* treatments. It was concluded that nanochitosan and nanozeolite showed positive effect on plant health, crop productivity, microbial population of maize rhizosphere and soil health.



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